

Practice Problem Set 4 [Two sample tests]

- Two types of cleansers (A and B) for an industrial component are being considered. Cleanser A was tested 10 times. On each test the amount of impurity recovered by the cleanser was recorded. Five similar tests were done using cleanser B .

A	0.48	0.49	0.97	1.22	1.40	1.96	2.30	2.46	3.78	6.63
B	1.10	2.20	2.61	3.43	5.04					

- Test for the equality of the variances using $\alpha = 0.05$.
 - Assuming that the variances are equal, test for the equality of means using a pooled variance procedure. Use $\alpha = 0.05$. State your hypotheses, decision and conclusion.
 - Construct a table giving the combined ranks of the two samples.
 - Calculate the Wilcoxon rank sum statistic. Use this to test whether or not there is a difference in median impurity recovered between the two cleansers. Use $\alpha = 0.05$. State your hypotheses, decision and conclusion.
- The following question uses data from Centerwall, B.S., Armstrong, C.W., Funkhouser, L.S. and Elzay, R.P. (1986) (Erosion of dental enamel among competitive swimmers at a gas-chlorinated swimming pool, *American Journal of Epidemiology*, **123**, 641-647). In this study, of 49 swimmers with dental enamel erosion, 32 report swimming at least 6 hours a week. Of 245 swimmers with no dental enamel erosion, 118 report swimming at least 6 hours.

Hours swimming per week	Erosion	No Erosion	Total
≥ 6	32	118	150
< 6	17	127	144
Total	49	245	294

- Is there evidence that the proportions of swimmers swimming at least 6 hours is higher among those with erosion? Test using $\alpha = 0.05$. State your hypotheses, decision and conclusion.
- Construct a 99% confidence interval for the difference in proportions swimming at least 6 hours between the group with enamel erosion and the group without.